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English we use different terms when speaking of the darkness of night and the black of a dress; or of the blonde hair and the yellowish-white corresponding color of other objects striking our eye-sight. The occasional existence of more than one term for *one* color for the reason just alluded to is observed in the languages of every portion of the globe. Curiously enough the *red* color is not often diversified into different shades in the languages considered; in Spanish it is *colorado*, "showing color;" this evidently means that red is the color striking our eye with the greatest intensity.

7. Reduplication of the *radix* is very often met with in color names, but the cause of this is not always the same. In Klamath and the Sahaptin dialects it is distribution and repetition, in Dakota it is the idea of intensity that has produced this synthetic feature.

We think the inquiry into the color-sense and that into the color-blindness among the individuals of a people must be kept distinct from each other. It is premature to assume that a whole people can be color-blind, though its color nomenclature may largely differ from ours, but it is by no means improbable that color-blindness is more frequent among hunting and nomadic nations than among individuals of civilized races. This question can be decided by direct experimental observation only, while in the inquiry concerning color-sense, the science of linguistics is entitled to take part in the discussion.

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## THE HABITS OF A TARANTULA.

BY MRS. MARY TREAT.

FOR the past year I have been observing a large burrowing spider belonging to the family of *Lycosidæ*. Its habits and probably the creature itself, had entirely escaped the attention of naturalists until recently. Its habitat is in Southern New Jersey. In the grove which surrounds the house where my observations were made, are many burrowing spiders which build open tubes lined with a web of silk, and a projecting rim of sticks and leaves are firmly held together with web to keep the sand and *debris* from falling into the nest.

Last summer (1878), I accidentally found a covered tube, perfectly concealed, which aroused my curiosity sufficiently to keep

close watch of the occupant. I did not pay much attention to the open-mouthed tubes for some time, as I supposed the occupants to be a distinct species from the one which covered the tube.

In July of last summer the Rev. Dr. McCook, of Philadelphia, the distinguished myrmecologist, upon invitation, visited my colony of slave-making ants (*Formica sanguinea*), and while on this visit I called his attention to the burrowing spider with the open tubes. After his return home he wrote me that he thought the spider a new species which he had provisionally named *Tarentula tigrina*,<sup>1</sup> or the tiger spider. But the spider with the covered tube was of so much more account that I still paid no attention to this one which lived in the open burrow! But I am now convinced, after a year's observation, that what I supposed to be two distinct species are but one. The young scarcely ever conceal their tubes.

A brief account of one individual spider will, perhaps, give a clearer idea of this species than any attempt at a learned disquisition. A large female has her home in a bed of moss beneath an oak tree, only a few feet from the house. Her body is nearly black and quite hairy, the legs are gray and black, striped after the fashion of a tiger. When I first observed her the tube was only partially covered, the cover projecting above it like a hood or top of a baby carriage. When not disturbed, she usually stood at the door of her home waiting for any chance insect which she might spring upon.

My visits to her were very frequent, and for several days upon my approach she would suddenly disappear within her den, but finally she seemed to become accustomed to these visits and would allow me to sit near her, keeping her position at the door. I supplied her with water, of which she would take long draughts. I also placed sugar near her door to attract the flies. She would stand perfectly motionless, watching the eager insects, until she fixed her eyes upon one that suited her taste when she sprang upon it like a flash, and disappeared within her den to make her meal. This kind of life continued for several weeks—simply watching for prey and eating. But in August another phase in her life was made manifest. A male was attracted to her cozy quarters. He does not look at all like the female, is of an entirely

<sup>1</sup> Proceedings of the American Entomological Society, 1878.

different color—yellowish with dashes of dark brown—his body is smaller than hers though his legs are longer.

In August the males are abundant. I often see them bounding over grass and weeds, making long strides, fairly flying before me. At such times it is next to an impossibility to capture one. I have not been able to ascertain whether he has a settled home like the female, which he leaves to make amorous visits, or whether he always leads a vagrant kind of life.

He approaches the female with the utmost caution. If she is within her den he stands at the door, sometimes hours together; nothing will induce him to venture within, and he is wonderfully oblivious of my presence. I cannot push him in, he will back out into my hand rather than be driven into the burrow. Now the female slowly advances to meet him, and he slowly retreats from the mouth of the den, moving backward while she moves forward, just reaching him with the tips of her fore-legs as if caressing him. She follows him in this way a foot or more, then leaves him and quickly returns to her den, he follows her to the door, where he keeps his post until she again comes forth, when the same performance is repeated.

I leave them, and on my next visit I find the male on the back of the female, with their heads both within the burrow and their long hind-legs sticking out. (This is not the position the spider assumes when he fertilizes the eggs, which is done by means of the palpal organs, necessitating the opposite direction of the head.) They now remain perfectly still, and I pick them up by their legs and drop them into a wide-mouthed glass bottle. This displaces the male, and he crouches down in a helpless sort of way as if paralyzed with fear, not trying to make his escape at all. For a few moments the female pays no attention to him but makes vigorous efforts to escape. Soon, however, she pounces upon him, seizing him on the under side of the head—literally by the throat. He makes but feeble efforts of resistance, in fact, acts as if he rather enjoyed being eaten! I shake the bottle but she will not let go her hold. She soon makes him into a ball which she holds and sucks, seemingly with great relish. I now place the open bottle by the mouth of her den and she quickly disappears, taking with her the remains of her lover. In a day or two after this another male was at her door behaving in a similar manner. I did not interfere with his movements, and do not know his fate.

After a few days the female resumed her old habits, watching for prey, and became so tame that she would take water from my hand. She made but little change to the partial cover of her tube until November, then it was cut down and made flat to the ground—perfectly concealed with leaves and moss and held firmly down with a strong web. This cover remained until the following April. I was waiting to see what the occupant would do, when an accident occurred. I was absent when the leaves were raked up, and the man, not observing my protection, raked all away. But in a few days thereafter the spider made another cover, entirely unlike the winter one, more like a little room. The nest is situated in a bed of green moss, and the cover looks like a little oval mound of moss and leaves. The longest diameter measures five inches over, and the shortest, four and a half inches. The base of the cover is made of acorn cups and sticks firmly held together with strands of silk, then a canopy of web is made, and over this is laid green moss, dry pine needles, bits of dry oak leaves and light sticks held fast with web. This makes a neat little upper room, the walls are smooth on the inside but rough outside. She leaves a window in the room, the object of which is apparent. She has a cocoon of eggs attached to the spinneret, and she puts herself in position to let the cocoon rest against the window where it receives the rays of the sun. For three weeks this has been her daily occupation—patiently holding the eggs in the sun.

On the 20th of May I took the cover from the tube and after it was removed it was some hours before I saw her, but toward evening she reached out with her hind-legs; feeling for material, she first

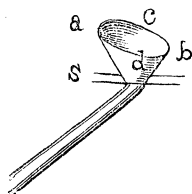


FIG. 1.—s, surface of ground; a b c d, silk-lined tunnel.

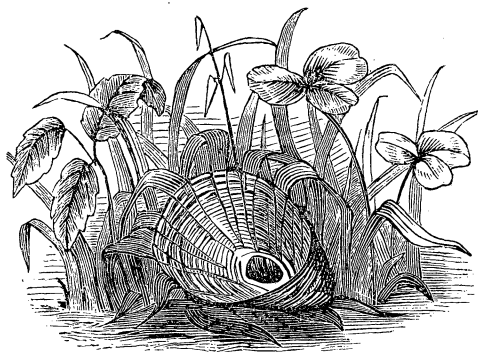


FIG. 2.—Nest of *Tarentula tigrina* (♀).

drew in an acorn cup and proceeded to fasten it. How it was

done I cannot tell, for the cocoon of eggs seem to be attached to the spinneret. On the following morning a broad funnel-shaped rim was built around the tube but not yet covered; by the 24th she has made a room lightly covered with moss.

Rev. Dr. McCook kindly furnished cuts of the nest with the open funnel. I append his description, which was published in the Proceedings of the Academy of Natural Sciences of Philadelphia: "The tube is about seven and one-half inches deep, resembling an ear-trumpet (Fig. 1), with the mouth upward. It is bent at an angle of  $60^{\circ}$  shortly below the surface; the upper part is a silk-lined funnel that widens outwardly to the margin which at the highest point is one and one-eighth inches above the surface of the ground. The silken lining extends but a little way below the surface. The projecting funnel is composed of blades of grass (Fig. 2), which are bent down upon their stalks from all sides, overlaid, and rudely interwoven, making thus a background upon which the smooth silken lining is placed. The longest diameter of the mouth of the tube (Fig. 1),  $ab$ , is one and one half inches, the shorter diameter  $cd$ , is one and one-quarter inches. The diameter of the tunnel below the surface is five-eighths of an inch."

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## THE FORMATION OF CAPE COD.<sup>1</sup>

BY WARREN UPHAM.

THE peninsula of Cape Cod, called by Thoreau the "bended arm of Massachusetts," the Elizabeth islands, which are a continuation from it to the south-west, and Martha's Vineyard and Nantucket on the south, are recent additions to the territory of New England. They contain no ledges of solid rock, but are made up of the ruins and detritus of ledges which have been broken and pulverized. This has been done by decomposition under the influence of frosts and rains, by the excavations of

<sup>1</sup> A previous description of this region, based on observations made in a hasty journey for comparison of its drift deposits with those found in New Hampshire, was presented a year ago in the Geological Report of that State, Vol. III, pp. 300-305. Since that time the writer has been over this field more leisurely, spending several months in amateur exploration from Cape Cod and Nantucket westward to New Jersey. This has brought a more correct knowledge of the facts, especially in respect to the course, in South-eastern Massachusetts, of the series of hills here called terminal moraines; as well as some changes in opinions, one of these being in respect to the probable height of the sea here when these deposits were accumulated.